REMARKS

The Office Action mailed October 23, 2001, has been received and its contents carefully noted. In order to advance prosecution, claims 5-8 have been cancelled and new claims 9-11 have been added to the Application.

New claim 9 finds support in claims 5 and 6, and in the specification on page 10, line 8, through page 11, the last line, as well as Table 1 on page 11. New claim 10 finds support in the basic definition of "oligomer" (see EXHIBIT A attached) and in embodiment 1 on page 23 of the specification where n = 5. New claim 11 finds support in embodiment 1 on page 23 of the specification where n = 5.

Claims 9-11 are now pending in the Application and are submitted to be in allowable condition.

The rejection of claims 7 and 8 under 35 U.S.C. §112, first paragraph, is moot in view of cancellation of claims 7 and 8.

Although claims 7 and 8 have been cancelled, Applicants respectfully traverse the Examiner's position that Applicants' "reactive oligomers" of formulae I and II are "monomers".

1. As shown on page 636 of attached EXHIBIT A, the technical definition of **"oligomer"** is, **"A polymer molecule consisting of only a few monomer units (dimer, trimer, tetramer)."** This is in contrast to the technical definition of **"monomer"** on page 590 of EXHIBIT A, **"A molecule or compound usually containing carbon and of relatively low molecular weight and simple structure, ..."**.

2. Applicants respectfully draw the Examiner' attention to the fact that formula (I) has a plurality of units (see that three n(s) are shown) and has a complex structure with a molecular

weight calculated to range from 2,000 to 3,000, so that it is Applicants' position that formula I is a "reactive oligomer" not a "monomer" contrary to the Examiner's position.

3. Dependent claims 10 and 11 have been added to make this clear.

4. Claim 10 recites, "... wherein the reactive oligomer having general formula (I) has a value for n which is a natural number greater than one.", which means that n = 2, 3, 4, 5, etc. and which Applicants submit clearly falls within the definition of "oligomer".

5. Claim 11 recites, "... wherein the reactive oligomer having general formula (I) has a value for n which is five.", which clearly falls within the definition of "oligomer" and which finds support in embodiment 1 discussed on page 22, line 17, through page 23, line 4, of the specification where an embodiment of formula I for which n = 5 is described.

6. However, Applicants consider that formula I is an oligomer not only when n = 2, 3, 4, 5, etc., but also when n = 1. This is because formula (I) has a plurality of units (see that three n(s) are shown) and a complex structure so that formula I with n = 1 is not considered to fall within the definition of "monomer".

The rejection of claims 5-8 under 35 U.S.C. §112, second paragraph, is moot in view of cancellation of claims 5-8.

The rejection of claims 5 and 6 under 35 U.S.C. §103(a) as being unpatentably obvious over Tsukamoto et al. (US 5,902,715) in view of Fan et al. (EP 0 446 672 A1) is moot in view of cancellation of these claims and is respectfully traversed new claims 9-11.

Applicants do not agree that the combined disclosures of Tsukamoto et al. and Fan et al. set out a *prima facie* case of obviousness against new method claims 9-11 because the combined

disclosures do not meet method claims 9-11. Neither Tsukamoto et al. nor Fan et al. disclose Applicants' claimed composition and advantages to be discussed in the following.

1. The present invention is described in the specification on pages 10 and 11, and in Table 1. A mixture containing a reactive oligomer and a photopolymerization initiator is prepared. Viscosity of the mixture is controlled in a range from 500 cps to 10,000 cps by blending the reactive oligomer in an amount ranging from 10 to 50 wt%. Spin coating of the mixture on the under cladding layer advantageously forms an uniform layer of the mixture (photosensitive material).

2. Polymeric materials have superior film-forming properties compared to silica-based materials. Spin coating of polymeric materials is simple and is preferred for preparation of a high quality, uniform film. Formation of a multi-mode optical waveguide requires that a film having a thickness of at least 50 μm be deposited. In order to form a high quality film, the viscosity of the polymeric materials must be controlled to provide a viscosity ranging from 500 cps and up. Further, in order to obtaining a film having the desired uniformity, the viscosity of the polymeric materials must be controlled to provide a viscosity ranging up to but less than 10,000 cps as described on page 15, lines 1-5, of the specification.

3. Applicants investigations of methods to provide high quality film forming resulted in the discovery that a photosensitive substance containing the reactive oligomer of general formula (I) has a viscosity which can be controlled by controlling the content of the reactive oligomer of the general formula (I) in the mixture. The found relation between the content and the viscosity is as shown in Table 1 on page 11 of the specification. When the content of the oligomer is 10 wt.%, the viscosity is adjusted to about 500 cps, and when the content of the oligomer is 50 wt.%, the viscosity is adjusted to 10,000 cps.

4. The present method employs spin coating as a simple method for forming a uniform film of the photosensitive substance that can be from a pattern having steep, smooth wall surfaces, by blending the oligomer in a range between 10 wt.% and 50 wt.% to control viscosity of the photosensitive substance in a range from 500 cps to 10,000 cps.

5. Tsukamoto et al. teach a method of forming a mirror in a waveguide. The Examiner considers that Example 11 [sic Embodiment 11] teaches a method including the steps of:

formation on a substrate of a photosensitive layer including EHPE-3150, which the Examiner considers reads on Applicants' formula I;

image-wise exposure using a mask; and

solvent development.

6. Fan et al. teach a method of forming a polymeric waveguide. The Examiner considers that Figures 3(a)-(e) teach a method including the steps of:

coating a cladding layer;

formation of a waveguide core using a photosensitive polymer by spin coating (Example 1);

lithographic patterning for exposing selected areas;

solvent removal of undesired material to form the ridge core; and

over coating with an upper cladding layer.

7. The Examiner has taken the position that it would have been obvious to an artisan to modify the process of Examples 17 [sic Example 11?] of Tsuksmoto et al. by using epoxies known to be useful as waveguide cores, such as EPHE-3150, and to develop them using solvents to remove the uncured portions of the epoxy waveguide layer as taught in Fan et al. and to position cladding layers above and below the waveguide core as taught in Fan et al.

8. The present invention as now claimed is submitted to be distinguishable in that Applicants' method includes controlling viscosity :

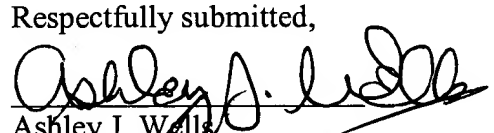
"... preparing a mixture containing a reactive oligomer having general formula (I) and a photopolymerization initiator by blending, and **controlling viscosity of the mixture** to provide a viscosity mixture ranging from 500 cps to 10,000 cps by blending the reactive oligomer in an amount ranging from 10 to 50 wt %,...".

9. Neither Tsukamoto et al. nor Fan et al., taken alone or in combination, disclose Applicants' step of controlling viscosity for Applicants' claimed composition and the advantages gained thereby, including high performance and low price, as discussed in the foregoing. In view of this, Applicants submit that the method according to new claims 9-11 may not be said to be taught or suggested by the combined teachings of Tsukamoto et al. and Fan et al. so that this ground of rejection should be withdrawn.

In view of the foregoing amendments and remarks, it is requested that the rejections of record be reconsidered and withdrawn, and new claims 9-11 be allowed, and that the Application be found to be in allowable condition.

Should the Examiner not find the Application to be in allowable condition or believe that a conference would be of value in expediting the prosecution of the Application, Applicants request that the Examiner telephone undersigned Counsel to discuss the case and afford Applicants an opportunity to submit any Supplemental Amendment that might advance prosecution and place the Application in allowable condition.

Respectfully submitted,



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DC2-DOCS1-346149